IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant:	Schmeichel et al.	Examiner:	Tran
Serial No.:	10/646,359	Group Art Unit:	3748
Filed:	August 22, 2003	Docket No.:	758.1452USU1
Title:	Apparatus for Emission Control, Systems, and Methods		

DECLARATION OF EIVIND STENERSEN

I, Eivind Stenersen, depose and say as follows:

1. I am an employee of Donaldson Company, Inc. where my title is Director of Product Development for the Engine Emissions Group. My responsibilities include the development of new products for treating diesel engine emissions. In this role, I am knowledgeable about diesel engines and diesel engine emissions.

2. I received a Bachelor of Science degree and a Master of Science degree in Mechanical Engineering from the University of Minnesota with emphasis on power and propulsion systems. My master's degree thesis was directed toward cycle to cycle variability in emissions from diesel engines. This education has provided me with a strong background relating to the design of diesel engines and gasoline spark ignition engines. This education has also provided me with thorough knowledge of gasoline spark ignition engine exhaust emissions and diesel engine exhaust emissions.

3. Before being employed at Donaldson Company, I was employed by Cummins Engine Company as an engine performance development engineer.

4. Un-treated diesel engine exhaust is different from un-treated gasoline spark ignition engine exhaust. For example, diesel engine exhaust is typically much higher in particulate matter and in some conditions NO_X than gasoline spark ignition exhaust, while gasoline spark

ignition engine exhaust is higher than diesel engine exhaust in harmful gas emission such as carbon monoxide (CO) and various hydrocarbons (HC) or volatile organic carbons. The differences in exhaust content are directly related to the differences in the combustion processes and the air to fuel ratios.

5 In diesel engines, combustion occurs when fuel is injected into high pressure air within an engine cylinder. High pressure air causes the fuel to compression-ignite. Diesel engines are fuel efficient because combustion typically occurs at very lean air to fuel ratios, compression ratios are high (15-1 or higher) and there is no intake throttling. Thus, diesel exhaust typically has a high concentration of oxygen. In gasoline spark ignition engines, combustion occurs when a mixture of air and fuel are exposed to a spark within an engine cylinder. The spark initiates a flame that propagate across the combustion chamber and consumes the pre-mixed air/fuel mixture. This combustion reaction typically occurs at an air to fuel ratio close to, or at stoichiometric. Thus, gasoline spark ignition exhaust typically has a low concentration of oxygen.

6. I have reviewed U.S. Patent No. 4,282,713 (the '713 patent) in detail. In my opinion, the '713 patent discloses a gasoline spark ignition engine system, not a diesel engine system. At least some of the reasons supporting my opinion are set forth below at paragraphs 7-10.

7. Column 6, lines 50-58 of the '713 patent describes an ignition advance system used by the engine 10. The ignition advance system includes elements such as a breaker cam 143, a breaker contact arm 144 and a breaker plate 145. These types of structures are used in gasoline spark ignition engines to control the spark timing within an engine cylinder. These types of structures are not used in diesel engines.

8. The '713 patent identifies the catalytic converter 16 as a three-way catalytic converter (see column 3, lines 8-10). Three-way catalytic converters are used in gasoline spark ignition engines to allow NO reduction and CO and HC oxidation to occur at a single catalyst bed. This is possible in gasoline spark ignition engines because the combustion reaction occurs at an air to fuel ratio close to stoichiometric. However, under lean conditions such as those found in diesel exhaust, a three-way catalyst can not effectively reduce NO. Therefore, three-way catalysts are not used to treat diesel engine exhaust.

9. The engine 10 of the '713 patent includes a throttle valve 26 (see column 3, line 13). The position of the throttle valve 26 is related to engine speed. As the engine speed rises, the throttle is open (see column 5, lines 6-13). The throttle valve 26 is closed upon deceleration such that vacuum develops in the induction passage section 18a (see column 5, lines 42-51). Ignition timing is retarded when vacuum prevails in the induction passage section 18a, and ignition timing is advanced when pressure is restored in the induction passage section 18a (see column 6, lines 50-55). This type of arrangement is consistent with a gasoline spark ignition engine, not a diesel engine. Diesel engine systems typically do not have throttles for controlling engine power and do not typically develop vacuum in the intake. In diesel engines, engine power is controlled by the amount of fuel injected directly into the engine cylinder.

10. The engine 10 of the '713 patent includes fuel injection valves 28 installed in the intake manifold leading to the combustion chamber (see column 3, lines 14-16). A mixture of fuel and air is fed from the intake manifold to the combustion chamber (see column 3, lines 17-25). An exhaust gas sensor 14 (e.g., such as an oxygen sensor) and an air flow meter 24 are used to control the air/fuel ratio of the mixture that is fed from the intake manifold into the combustion chamber. This type of arrangement is consistent with a gasoline spark ignition engine, not a

diesel engine. Diesel engines typically do not inject fuel into the intake manifold. Instead, fuel is injected directly into the cylinder by a high pressure injector on the cylinder head.

11. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such false statements may jeopardize the validity of the application or any patent issued thereon.

Date: 12/20/2006 By: _____

Eivind Stenersen